PROJECT SUMMARY SHEET

PROJECT TITLE NAME: Marshall County Lakes Assessment
NAME AND ADDRESS OF LEAD PROJECT SPONSOR:

Marshall Conservation District
P.O. Box 8
Britton, SD 57430-0008

LOCAL CONTACT:

Roger Gresh
Prairie Agricultural Research, Inc.
42517 State Highway 10
P.O. Box 1075
Britton, SD 57430
Telephone: (605) 448-5256

STATE CONTACT:

Rich Hanson, Environmental Program Scientist
SDDENR
523 East Capitol Avenue
Pierre, SD 57501
Telephone: (605) 773-4254
Fax: (605) 773-4068

STATE: South Dakota WATERSHED: James River HUC#: 101600100

PROJECT TYPES : [] BASE [x] WATERSHED [] GROUNDWATER [] I&E

WATERBODY TYPES	NPS CATEGORY	
[ ] Groundwater	[x] Agriculture	[ ] Hydrologic modification
[x] Lakes/Reservoirs	[ ] Urban Runoff	[ ] Other
[ ] Rivers	[ ] Silviculture	
[x] Streams	[ ] Construction	
[ ] Wetlands	[ ] Resource Extraction	
[ ] Other	[ ] Stowage and Land Disposal	

PROJECT LATITUDE 45.673809 LONGITUDE -97.318471

SUMMARIZATION OF MAJOR GOALS:

The goal of the Marshall County Lakes Assessment Project is to locate and document sources of nonpoint source pollution (primarily excess nutrients and sediment loading) in the watersheds of Nine Mile Lake, South Red Iron Lake, and Buffalo Lakes. This project will produce TMDL reports for these lakes and feasible restoration recommendations that may lead to a watershed implementation project.

PROJECT DESCRIPTION:

Nine Mile Lake, South Red Iron Lake, and Buffalo Lakes are natural glacial lakes in Marshall County in northeastern South Dakota. About 66% of Marshall County is cropland (wheat,flax, and livestock feed crops) and the remainder is pasture land, wetlands, pothole lakes. The lakes receive runoff from agricultural operations and the creeks in the watersheds and the lakes have experienced declining water quality. Nine Mile Lake has a surface area of 282 acres. South Red Iron Lake has a surface area of 610.2 acres. Buffalo Lakes has a surface area of 2,521 acres. The combined watershed area for these lakes is 43,385 acres. Through water quality monitoring, stream gauging, stream channel analysis and land use analysis, the sources of impairment to the stream and the watershed will be documented and feasible recommendations for restoration will be presented in the final project report.

319 funds requested $155,000 Local Match $37,000
Other Federal Funds $ 0
319 Full Time Employee Equivalents 1 Total project cost $192,000

2.0 STATEMENT OF NEED

2.1 The purpose of this assessment is to determine the sources of impairments to Nine Mile Lake, South Red Iron Lake, Buffalo Lakes, and their associated tributaries in Marshall County, South Dakota. The creeks and small tributaries are intermittent streams with loadings of sediment and nutrients related to snowmelt or rainfall events. A large number of pothole wetlands are also in the watershed.

2.2 Nine Mile Lake, South Red Iron Lake, and South Buffalo Lakes are natural glacial lakes and are listed on the State 303(d) list. North Buffalo Lake is not on the State 303(d) list but will be included in the project. For this project, "Buffalo Lakes" refers to both North and South Buffalo Lakes.

The streams in the watershed drain predominantly agricultural lands with both cropland and grazing acres. Feedlots and winter feeding areas for livestock are present in the watershed. The streams carry sediment loads and nutrient loads, which degrade water quality and cause increased eutrophication of these lakes.

The watershed area for Nine Mile Lake is approximately 2,560 acres. The watershed area for South Red Iron Lake is approximately 9,862 acres. The combined watershed area for the Buffalo Lakes is approximately 18,541 acres. No large municipalities are located in these watersheds and residences in these areas are serviced by on-site septic systems.

The only species listed in the federal list of threatened and endangered species is the bald eagle (Haliaeetus leucocephalus), which is listed as threatened. This species is not likely to be impacted by the assessment work of this project.

2.3 See map in Figure 1.

2.4 Land use in the watersheds is primarily agricultural cropland and grazing. Row crops and hay are the main crops on cultivated lands. Some animal feeding areas are located in the watershed.

The major soil association found in the Nine Mile Lake watershed is the Forman-Aastad-Buse association. For the South Red Iron Lake watershed it is the Forman-Poinsett and the Renshaw-Fordville-Sioux associations. For the Buffalo Lakes watershed it is the Renshaw-Fordville-Sioux association.

The average annual precipitation in the watershed is 19.24 inches of which 80% usually falls in April through September. Tornadoes and severe thunderstorms strike occasionally. These storms are local and of short duration and occasionally produce heavy rain fall events. The average seasonal snowfall is 22.6 inches per year.

2.5 The purpose of this assessment is to develop TMDLs and restoration recommendations for Nine Mile Lake, South Red Iron Lake, and Buffalo Lakes and their associated streams in the watershed. This assessment will serve as the foundation of a Section 319 implementation project.

3.0 ASSESSMENT WORKPLAN

3.1 The Marshall County Lakes Assessment Project is a comprehensive assessment that will address nutrient and sediment problems in the lakes and their watersheds. The overall goal is to produce TMDLs for trophic state and trend to improve the water quality by reducing nutrient and sediment loading of the streams and lakes. This project will produce the information needed for planning an effective implementation project. Reducing nonpoint pollutants in the watershed will improve the water quality for lakes; improve habitat for upland and aquatic species and will improve the recreational uses of these lakes.

3.2 OBJECTIVES AND TASKS

OBJECTIVE 1: The objective of this task is to determine current conditions in the lakes and calculate the trophic state of the lakes. This information will be used to determine the total amount of nutrient trapping that is occurring in the lakes and the amount of reduction of nutrients required to improve the trophic condition of Nine Mile Lake, South Red Iron Lake, and Buffalo Lakes.

TASK 1 Nutrient and solids parameters will be sampled at three in-lake sites at South Red Iron Lake and South Buffalo Lake, at two sites at Nine Mile Lake, and at one site on North Buffalo Lake (Figures 2-4). The South Dakota State Health Laboratory in Pierre will analyze all samples. Samples will be collected from the surface and bottom of the lakes on a monthly schedule for a period of 1 year except during periods of unsafe ice cover and during June, July, and August. During the summer months, samples will be taken twice a month. A total of 234 samples will be collected for the lakes.

TASK 2 The purpose of the in-lake samples is to assess ambient nutrient concentrations in the lakes and identify trophic state. Water column dissolved oxygen and temperature profiles will be collected on a monthly basis. Water samples will be collected and the sample bottles will be iced and shipped to the lab by the most rapid means available. The SD State Health Lab in Pierre will analyze fecal coliform samples. Staff from Watershed Protection will identify and count algae samples in the Matthew Training Center Laboratory. A private consultant will be contracted to count and identify macroinvertebrate samples. A macrophyte survey will be conducted during the summer to assess relative percent coverage of the lakes by macrophytes.

TASK 3 Collect sediment and water samples from mid-lake sites at Nine Mile Lake, South Red Iron Lake, and South Buffalo Lake and perform elutriate tests on the samples to assess nutrient content and potential nutrient inputs from the sediments. One elutriate test per lake will be conducted.

TASK 4 All samples will be collected using the methods described in the Standard Operating Procedures for Field Samplers by the State of South Dakota Water Resources Assistance Program. Figures 2-4 are maps of the lake and tributary sampling sites.

Lake Sampling Locations – Nine Mile Lake

Site	Location	
NIMILL01	Lat. 45.765095	Long. -97.464398

This site is located in the central portion of the north end of the lake.

NIMILL02	Lat. 45.770644	Long. -97.466151

Approximate central portion of the south end of the lake.

Lake Sampling Locations – South Red Iron Lake

Site	Location	
SREDL01	Lat. 45.680860	Long. –97.322778

Approximate central portion of the north end of the lake.

SREDL02	Lat. 45.673809	Long. –97.318471

Approximate central portion of the middle of the lake.

SREDL03 Lat. 45.665402 Long. –97.314348
Approximate central portion of the south of the lake.

Lake Sampling Location – North Buffalo Lake

Site	Location	
NBUFL01	Lat. 45.632857	Long. –97.289597

Approximate central portion of middle of lake.

Lake Sampling Locations – South Buffalo Lake

Site	Location	
SBUFL01	Lat. 45.627101	Long. –97.267917

Approximate central portion of north end of lake.

SBUFL02 Lat. 45.613335 Long. –97.291982
Approximate central portion of middle of lake.

SBUFL03 Lat. 45.610528 Long. –97.309403
Approximate central portion of south end of lake.

TABLE 1. INLAKE PARAMETERS TO BE MEASURED:*

Physical	Chemical	Biological
Air temperature	Total alkalinity	Fecal coliform
Water temperature	Field pH	E. Coli
Secchi transparency	Dissolved oxygen	Chlorophyll a
Depth	Total solids	Aquatic macrophytes
Visual observations	Total suspended solids	
	Volatile suspended solids	
	Ammonia	
	Un-ionized ammonia	
	Nitrate-nitrite	
	Total Kjeldahl nitrogen	
	Total phosphorus	
	Total dissolved phosphorus	
	Conductivity	

* Additional information about water quality and fish will be obtained from various sources and may include the SD Department of Game, Fish and Parks, universities, or the literature.

PRODUCTS:

In-lake water quality report.
Statistical evaluation of water quality and biological data for the lake.
Calculations of trophic state index using Carlson's Trophic State Index.
Dissolved oxygen and temperature profiles.

BUDGET:

LINE ITEMS	NON-FEDERAL CASH	NON-FEDERAL IN-KIND	FEDERAL 319	TOTAL
Local Coordinator (@ $15/hr)			$5,000	$5,000
Local Admin.			$4,000	$4,000
Travel	$3,150	$750		$3,900
Water Quality Analysis	$4,000		$31,100	$35,100
Supplies and Shipping	$1,000		$500	$1,500
Boat and Motor		$500		$500
Equipment			$500	$500
Total	$8,150	$1,250	$41,100	$50,500

RESPONSIBLE AGENCIES:

Task Responsibility:
Project Coordinator
Project Sponsor

Design and Technical Assistance:
South Dakota Department of Environment and Natural Resources

OBJECTIVE 2: Estimate the sediment and nutrient loadings from the individual tributaries in the Nine Mile Lake, South Red Iron Lake, and the Buffalo Lakes watersheds through hydrologic and chemical monitoring. The information will be used to locate critical areas in these watersheds to be targeted for implementation.

TASK 5 Install water level recorders on tributary monitoring sites and maintain a continuous stage record for the project period, with the exception of winter months after freeze up.

Site Location
NIMILT01 Lat. 45.761909 Long. -97.455761
Outlet at south side of Nine Mile Lake.

NIMILT02 Lat. 45.772661 Long. -97.460676
Tributary at northeast side of Nine Mile Lake.

NIMILT03 Lat. 45.775671 Long. -97.463072
Tributary at north side of Nine Mile Lake.

SREDT01 Lat. 45.671901 Long. -97.305371
Tributary at east side of South Red Iron Lake.

SREDT02 Lat. 45.684821 Long. -97.321969
Tributary at north side of South Red Iron Lake.

NBUFT01 Lat. 45.637980 Long. -97.279797
Tributary at northeast side of North Buffalo Lake.

NBUFT02 Lat. 45.645687 Long. -97.303427
Tributary at north side of Almos Lake, which is adjacent to North Buffalo Lake.

SBUFT01 Lat. 45.616312 Long. -97.321546
Tributary at east side of South Buffalo Lake.

SBUFT02 Lat. 45.602073 Long. -97.319339
Tributary at southeast side of South Buffalo Lake.

SBUFT03 Lat. 45.592936 Long. -97.268145
Tributary at south side of South Buffalo Lake.

SBUFT04 Lat. 45.612465 Long. -97.247537
Tributary at east side of South Buffalo Lake.

SBUFT05 Lat. 45.634780 Long. -97.260787
Tributary at northeast side of South Buffalo Lake.

SBUFT06 Lat. 45.625101 Long. -97.288488
Inlet/outlet between South Buffalo Lake and North Buffalo Lake.

TASK 6 Discrete discharge measurements will be taken on a regular schedule and during storm surges. Discharge measurements will be taken with a hand held current velocity meter.

TASK 7 Discharge measurements and water level data will be used to calculate a hydrologic budget for the stream systems. This information will be used with concentrations of sediment and nutrients to calculate loadings from the watershed.

TASK 8 Collect water quality samples from 14 tributary monitoring sites. Samples will be collected during spring runoff, storm events, and

monthly base flows. Proposed water quality monitoring sites may be found in Figures 2-4.

TABLE 2. PARAMETERS MEASURED FOR TRIBUTARY SAMPLES:

PHYSICAL	CHEMICAL	BIOLOGICAL
Air temperature	Total solids	Fecal coliform bacteria
Water temperature	Total susp. Solids	E. Coli
Discharge	Dissolved oxygen	Benthic macroinvertebrate
Depth	Ammonia	
Visual observations	Un-ionized ammonia	
Water level	Nitrate-nitrite	
	TKN	
	Total phosphorus	
	Total dis. Phosphorus	
	Volatile suspended solids	
	Field Ph	

TASK 9 Samples will be collected twice weekly during the first week of spring snowmelt runoff and once a week thereafter until runoff ceases. Storm events and base flows will be sampled throughout the project period for an estimated total number of 392 samples.

TASK 10 Benthic macroinvertebrate samples will be collected once during the project at each of the tributary monitoring sites. Three replicate samples will be collected at each monitoring site for a total of 42 samples. Samples will be collected using either a D-net or a Courtemanch sampler. All samples will be collected during a fall index period during the project and sent to a private consultant for processing.

LINE ITEMS	NON-FEDERAL CASH	NON-FEDERAL IN-KIND	FEDERAL 319	TOTAL
Local Coordinator (@ $15/hr)			$8,000	$8,000
Travel	$1,250		$1,250	$2,500
Biological Analysis	$4,200		$4,200	$8,400
Water Quality Analysis	$7,360		$49,340	$56,700
Supplies and Shipping			$2,000	$2,000
Equipment			$11,000	$11,000
Total	$12,810		$75,790	$88,600

QUALITY ASSURANCE/QUALITY CONTROL:

Approved QA/QC procedures will be utilized on all sampling and field data collection on the Marshall County Lakes Assessment Project. Please refer to the South Dakota Nonpoint Source Program Quality Assurance Project Plan for the details of the procedures to be followed.

PRODUCTS:

A tributary water quality report which will include a description of the relationship between and influence of chemical and physical data. Hydrologic and nutrient loads will be calculated for the entire watershed.

RESPONSIBLE AGENCIES:

Task Responsibility:

Project Coordinator
Project Sponsor

Design and Technical Assistance:

South Dakota Department of Environment and Natural Resources

WORK ACTIVITIES:

Water samples will be collected with a suspended sediment sampler when possible. All sample bottles will be iced and shipped to the lab and collected using the methods described in the Standard Operating Procedures for Field Samplers by the State of South Dakota Watershed Protection Program. Nutrient and solids parameters will be sampled at 13 tributary sites in the watersheds of Nine Mile Lake, South Red Iron Lake, and Buffalo Lakes. The South Dakota State Health Laboratory in Pierre, SD will analyze all samples. The watershed water quality data will be integrated together with the hydrologic loading to provide a complete analysis of the lakes.

OBJECTIVE 3: Ensure that all water quality samples are accurate and defendable through the use of approved Quality Assurance/Quality Control procedures.

TASK 11 The collection of all field water quality data will be accomplished in accordance with the Standard Operating Procedures for Field Samplers, South Dakota Nonpoint Source Program.

TASK 12 The number of QA/QC samples is based on a minimum of 10 percent of all the water quality samples collected. Potentially, up to 640 water samples could be taken during the project and so 128 samples will be collected for QA/QC purposes; 64 for field replicates and 64 for field blanks.

TASK 13 All QA/QC activities will be conducted in accordance with the Nonpoint Source Program Quality Assurance Project Plan.

TASK 14 The activities involved with QA/QC procedures and the results of QA/QC monitoring will be compiled and reported on in a section of the final project report and in all project reports.

LINE ITEMS	NON-FEDERAL CASH	IN-KIND	FEDERAL 319	TOTAL
Local Coordinator (@ $15/hr)			$2,000	$2,000
Water Quality Analysis	$4,000		$15,200	$19,200
Supplies and Shipping	$500		$500	$1,000
Total	$4,500		$17,700	$22,200

PRODUCTS:

A Quality Assurance/Quality Control monitoring report. A total of 128 samples will be collected for QA/QC purposes; 64 field replicates and 64 field blanks.

RESPONSIBLE AGENCIES:

Task Responsibility:

Project Coordinator
Project Sponsor

Design and Technical Assistance:

South Dakota Department of Environment and Natural Resources

WORK ACTIVITIES:

Approved QA/QC will be utilized on all sampling and field data collected during the Marshall County Lakes Assessment Project. Please refer to the South Dakota Nonpoint Source Program Quality Assurance Plan and the South Dakota Nonpoint Source Program Standard Operating Procedures for Field Samplers for details of the procedures to be followed.

OBJECTIVE 4: Evaluation of agricultural impacts to the water quality of the watershed through the use of the Annualized Agricultural Nonpoint Source (ANNAGNPS) model.

TASK 15 The Nine Mile Lake, South Red Iron Lake, and Buffalo Lakes watersheds will be modeled using the ANNAGNPS model. ANNAGNPS is a comprehensive land use model which estimates soil loss and delivery and evaluates the impacts of livestock feeding areas. The watershed will be divided into cells. Each cell will be analyzed after collecting several parameters for each cell with additional information collected for animal feeding operations.

TASK 16 This model will be used to identify critical areas of nonpoint source pollution to the surface waters in the watershed. Contributors of nutrients and sediments to surface water in the Nine Mile Lake, South Red Iron Lake, and Buffalo Lakes watersheds will be identified.

LINE ITEMS	NON-FEDERAL CASH	NON-FEDERAL IN-KIND	FEDERAL 319	TOTAL
Local Coordinator (@ $15/hr)			$15,000	$15,000
Travel	$500		$500	$1,000
Equipment	$3,290		$560	$3,850
Supplies and Shipping	$100		$100	$200
Total	$3,890		$16,160	$20,050

PRODUCTS:

Report on land use and pollution sources in the watershed.
Recommendations for remediation of pollution sources in the watershed.

RESPONSIBLE AGENCIES:

Task Responsibility:

Project Coordinator
Project Sponsor

Design and Technical Assistance:

South Dakota Department of Environment and Natural Resources

OBJECTIVE 5: Public participation and involvement will be provided for and encouraged.

TASK 17 Informational meetings will be held on a quarterly basis for the general public and to inform the involved parties of progress on the study. These meetings will provide an avenue for input from the residents in the area.

TASK 18 News releases will be prepared and released to local news media on a quarterly basis. These releases will be provided to local newspapers, radio stations and TV stations.

LINE ITEMS	NON-FEDERAL CASH	IN-KIND	FEDERAL 319	TOTAL
Local Coordinator (@ $15/hr)	$500			$500
Supplies and Shipping	$200		$250	$450
Total	$700		$250	$950

PRODUCTS:

Public input to the project.
Information and education about the project.
Involvement and/or input from the public will be documented.
A total of four news releases will be produced
A total of four meetings will be held.

RESPONSIBLE AGENCIES:

Task Responsibility:

Project Coordinator
Project Sponsor

Design and Technical Assistance:

South Dakota Department of Environment and Natural Resources

WORK ACTIVITIES:

Informational meetings will be held on a frequent basis for the general public to inform the involved parties of progress on the study and provide a means of public input.

OBJECTIVE 6: Development of watershed restoration recommendations.

TASK 19 Once the field data are collected, an extensive review of the historical and project data will be conducted.

TASK 20 Loading calculations based on project data will be done and a hydrologic, sediment and nutrient budget for each watershed will be developed.

TASK 21 The results of the ANNAGNPS modeling of the watershed will be used in conjunction with the water quality and hydrologic budget to determine critical areas in the watersheds.

TASK 22 The feasible management practices will be compiled into a list of recommendations for the development of an implementation project and included in the final project report.

LINE ITEMS	NON-FEDERAL CASH	IN-KIND	FEDERAL 319	TOTAL
Local Coordinator (@ $15/hr)	$1,500		$1,500	$3,000
Supplies and Shipping	$100			$100
Total	$1,600		$1,500	$3,100

PRODUCTS:

A list of viable watershed restoration recommendations and appropriate BMP's for the Nine Mile Lake, South Red Iron Lake, and Buffalo Lakes watersheds will be produced.

RESPONSIBLE AGENCIES:

Task Responsibility:

Project Coordinator
Project Sponsor

Design and Technical Assistance:

South Dakota Department of Environment and Natural Resources

WORK ACTIVITIES:

An extensive review and study of the historical and current data will be done to determine the best management practices and hydrologic restoration techniques needed to improve water quality and sediment transport in the Nine Mile Lake, South Red Iron Lake, and Buffalo Lakes watersheds.

OBJECTIVE 7: Write and publish a final report containing water quality results and restoration recommendations for the lakes and their

watersheds. In addition, semiannual, annual reports and a final report shall be submitted electronically to fulfill GRTS reporting requirements to the U.S. Environmental Protection Agency.

TASK 23 Produce loading calculations based on water quality sampling and hydrologic measurements.

TASK 24 Summarize the results of the ANNAGNPS model for the watershed and report locations of critical areas.

TASK 25 Write a summary of historical water quality and land use information and compare with project data to determine any possible trends.

TASK 26 Based on data, evaluate the hydrology of the Nine Mile Lake, South Red Iron Lake, and Buffalo Lakes watersheds and the chemical, biological, and physical condition of the streams.

TASK 27 Produce a summary report of all QA/QC activities conducted during the project and include in the final project report.

TASK 28 Write a description of feasible restoration recommendations and a TMDL for use in planning watershed nonpoint source implementation.

TASK 29 Produce semiannual and annual reports and a final report in electronic format to fulfill GRTS reporting requirements.

LINE ITEMS	NONFEDERAL CASH	IN-KIND	FEDERAL 319	TOTAL
Local Coordinator (@ $15/hr)	$4,000		$2,500	$6,500
Supplies and Shipping	$100			$100
Total	$4,100		$2,500	$6,600

PRODUCTS:

A final Report and TMDL incorporating all previously described objectives and semiannual, annual, and final GRTS reports.

RESPONSIBLE AGENCIES:
South Dakota Department of Environment and Natural Resources
Project Coordinator
Project Sponsor

WORK ACTIVITIES:

Statistical evaluation of all water quality and field data produced during the course of the study. Review and compilation of historical data will be completed. Restoration recommendations will be developed. Graphic presentations of the information will be produced.

3.3 MILESTONE TABLE - see attached milestone.

3.4 No special permits are required to do this assessment project.

3.5 The Marshall Conservation District is the lead project sponsor for this project. The conservation district is important to this project because of its relationship with landowners in the watersheds. The main problems with these lakes appear to be sediment and nutrient loadings.

4.0 COORDINATION PLAN

4.1 The following groups/agencies have agreed through an informal agreement to cooperate in the Marshall County Lakes Assessment Project. Additional entities such as the SD Department of Game, Fish and Parks may provide supplemental information.

Marshall Conservation District - Local Project Sponsor.

South Dakota Association of Conservation Districts – Local support and technical assistance.

USDA Natural Resource Conservation Service – Support and technical assistance in acquiring land use data.

US Environmental Protection Agency –Financial support and technical assistance.

South Dakota Department of Environment and Natural Resources – Financial support and technical assistance.

4.2 In December of 2001 a letter requesting assistance was received from the Marshall Conservation District requesting assistance for the preparation of an assessment study grant for three lakes in Marshall County.

4.3 Local organizations as well as the SD Nonpoint Source Task Force have expressed support for the Marshall County Lakes Assessment Project.

4.4 This project will coordinate with frequent informal conversations with state, federal, and local government agencies and through quarterly meetings with the conservation district.

4.5 There currently are no other agencies conducting assessment project activities on the Nine Mile Lake, South Red Iron Lake, and Buffalo Lakes watersheds.

5.0 EVALUATION AND MONITORING PLAN

5.1 The monitoring strategy is explained in section 3. The project will produce bi-annual progress reports. The sampling and analysis procedures required to complete the tasks within section 3 can be located in the Standard Operating Procedures for Field Samplers for the South Dakota Nonpoint Source Program (SOP). The specific locations of these sampling methods within the SOP as they pertain to each task are documented in Table 3 on the following page.

5.2 This assessment project consists of a combination of chemical, hydrologic, land use and biological analyses. Monitoring sites will be maintained and sampled on the Nine Mile Lake, South Red Iron Lake, and Buffalo Lakes watersheds. Ambient samples will be collected along with spring runoff and storm events. Stream discharge will be routinely measured. The chemical, physical, and biological parameters to be sampled during this project can be located in Table 1 and Table 2. Loads will be calculated based on the samples and data collected with the approved methods identified in section 5.1. A TMDL report will be produced for Nine Mile Lake, South Red Iron Lake, and Buffalo Lakes.

5.3 All water quality monitoring will be done in accordance with the approved South Dakota Nonpoint source Program Quality Assurance/Quality Control Project Plan and the Standard Operating Procedures for Field Samplers for the South Dakota Nonpoint Source Program.

5.4 Results from all water quality monitoring efforts under the Marshall County Lakes Assessment Project will be reported in the final project report. Data will be managed by the South Dakota Department of Environment and Natural Resources and maintained in a computer database. All sample data will be entered in the US EPA STORET Program by DENR. These data will be used as the foundation of a Section 319 Watershed Implementation Project proposal.

6.0 BUDGET

See attached budget pages

7.0 PUBLIC INVOLVEMENT

See Objective 5.

TABLE 3. Location of Sampling and Analysis Procedures for each applicable task involved with the Marshall County Lakes Assessment Project.

TASK NUMBER	TASK DESCRIPTION	ACTIVITY	REFERENCE IN SDWRA-2000 SOP
Task 1	Inlake Surface and Bottom Sampling at 9 inlake sites for Nutrient and Solids Parameters (Table 1). An estimated 234 samples are to be collected.	Inlake Sampling	Section 7.0 pges 1-11
Task 2	Water Column dissolved oxygen and temperature profiles. Fecal coliform and chlorophyll *a* sampling will also be conducted.	D.O. and Temp. Profiles. Fecal, and Chl-*a* sampling	Section 7.0 pges 1-5 Section 7.0 pg 12
Task 3	Collect water and sediment samples for elutriate tests. Total of three tests.	Elutriate Testing	Section 7.3 pges 1-5
Task 4	All Inlake Samples collected using the methods described in the SOP for field samplers by the State of South Dakota Water Resources Assistance Program.	Inlake Sampling	Section 7.0 pges 1-12
Task 5	Install water level recorders and monitor stage record.	Water Levels	Section 5.0 pg. 10
Task 6	Discrete discharge measurements will be taken on a regular schedule and during storm surges.	Flow (Marsh-McBirney) or Flow (AquaCalc)	Section 7.1 pges 5-9
Task 7	Use discharge and stage data to calculate hydrologic budget for lakes.	Hydrologic budget	N/A
Task 8	Collect water quality samples from 14 tributary monitoring sites. Table 2 shows the parameters to be measured.	Tributary Sampling Procedures	Section 7.1 pges 1-18
Task 9	Sampling twice weekly during snowmelt and once a week thereafter until runoff ceases. Storm events and base flows will be sampled throughout the project period for an estimated total number of 378 samples.	Tributary Sampling Procedures	Section 7.1 pges 1-18
Task 10	Collect macroinvertebrate samples and riparian metrics to characterize tributaries.	Macroinvertebrate sampling	Section 15.1 (currently under revision)
Task 11	The collection of all field water quality data will be accomplished in accordance with the Standard Operating Procedures for Field Samplers, South Dakota Nonpoint Source Program.	Quality Assurance	Section 10.0 pges 1-3
Task 12	A minimum of 10 percent of all the water quality samples collected will be QA/QC samples. QA/QC samples will consist of 64 field blanks and 64 field duplicate samples.	Quality Assurance	Section 10.0 pges 1-3
Task 13	All QA/QC activities will be conducted in accordance with the Water Resources Assistance Program Quality Assurance Project Plan.	Quality Assurance	Section 10.0 pges 1-3
Task 14	The activities involved with QA/QC procedures and the results of QA/QC monitoring will be compiled and reported in	Quality Assurance	Section 10.0 pges 1-7

	a section of the final project report and in all project reports.		
Task 15	Use of the AGNPS computer model	Watershed Modeling	Section 17.0 pg 1

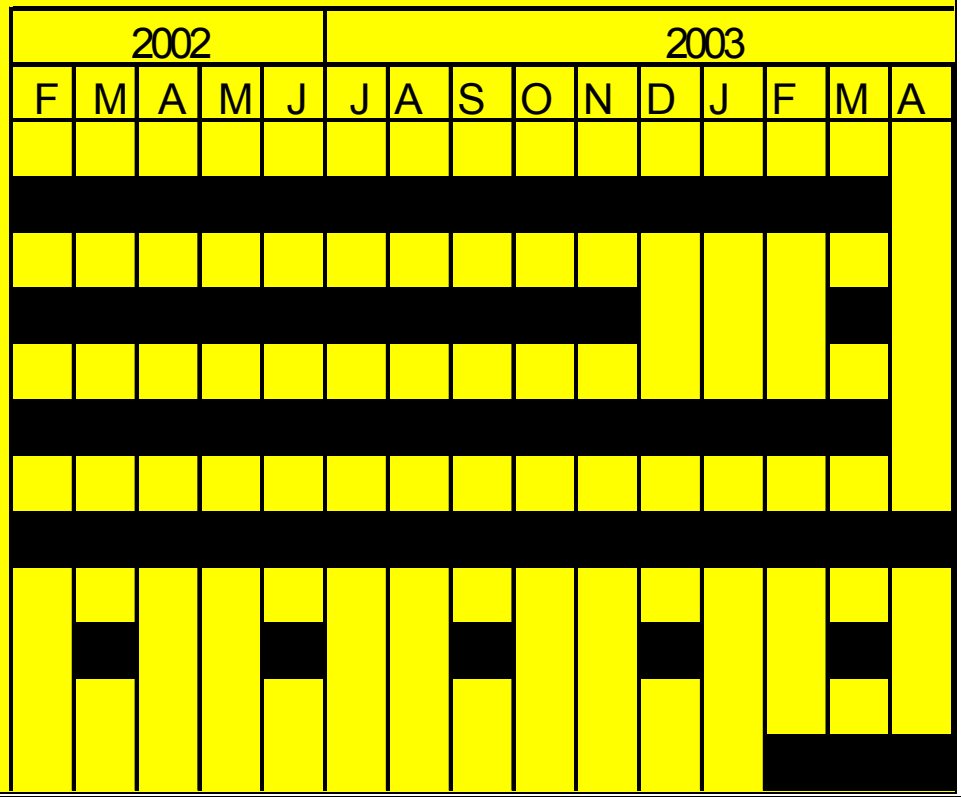
MARSHALL COUNTY LAKES ASSESSMENT PROJECT BUDGET			
PART 1: FUNDING SOURCES	**2002**	**2003**	**TOTAL**
EPA SECTION 319 FUNDS	$124,000	$31,000	$155,000
NONFEDERAL FUNDS	$22,000	$15,000	$37,000
TOTAL BUDGET	$146,000	$46,000	$192,000

*INCLUDES MULTIPLE COMMUNITY ORGANIZATIONS AND AGENCIES

Marshall County Lakes Assessment Project
Marshall Conservation District
Proposed
Budget
2002-2003

	Total Budget	Federal 319 Funds	Non-Federal Funds
Personnel @$15/hr	$40,000	$34,000	$6,000
Local Admin.	$4,000	$4,000	
Lab Analyses 754 samples@$150	$111,000	$95,640	$15,360
Biological analysis @200/sample	$8,400	$4,200	$4,200
Equipment	$15,350	$12,060	$3,290
Travel	$7,400	$1,750	$5,650
Supplies and Shipping	$5,350	$3,350	$2,000
Boat and Motor	$500		$500
TOTAL	**$192,000**	**$155,000**	**$37,000**

MARSHALL CO. LAKES ASSESSMENT
Marshall Conservation District
Milestone Chart
2002-2003



SOUTH DAKOTA NONPOINT SOURCE PROGRAM
QUALITY ASSURANCE PROJECT PLAN

SUBMITTED BY:

SOUTH DAKOTA DEPARTMENT OF ENVIRONMENT AND NATURAL RESOURCES
DIVISION OF FINANCIAL AND TECHNICAL ASSISTANCE
WATER RESOURCES ASSISTANCE PROGRAM

Prepared by: Robert Smith
Feburary, 2001

Project Title: Marshall County Lakes Assessment Project

APPROVED BY:

South Dakota Watershed Protection Program Environmental Senior Scientist, Assessment Section	Date
South Dakota Watershed Protection Program Project Officer	Date
South Dakota Watershed Protection Program Quality Assurance Coordinator	Date
South Dakota DENR Quality Assurance Officer	Date